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Variability of the North Atlantic Oscillation in the 20th century

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The North Atlantic Oscillation (NAO) has over the year a major influence on European weather. In many applications, being it in modern or paleo climate science, the NAO is assumed to varying in strength, but otherwise often understood as being a constant feature of the pressure system over the North Atlantic. In recent years investigations on the seasonal-predictability of the winter NAO has shown that the prediction skill is varying over time. This opens the question, why this is the case and how well models are able to represent the NAO in all its variability over the 20th century.

To investigate this further we take a look at a seasonal prediction of the NAO with the Max Planck Institute Earth System Model (MPI-ESM) seasonal prediction system, with 30 members over the 20th century. We analyse its dependence of prediction skill on various features of the NAO and the North Atlantic system, like the Atlantic Multidecadal Variability (AMV). As such we will demonstrate, that the NAO is a much less stable system over time as currently assumed and that models may not be in the position to predict its full variability appropriately.